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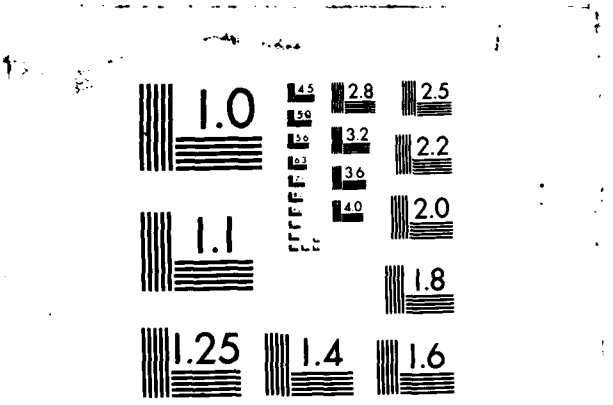

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DMA MAP/CHART REDESIGN STUDY
TPC, 1:50,000, 1:100,000, JOG

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ABSTRACT

DMA has initiated a study to improve map and chart designs. The purpose is to provide the user with a more readable, useable product and at the same time reduce DMA production costs. The products selected for possible redesign are the Tactical Pilotage Chart, 1:50,000 scale topographic map, 1:100,000 scale topographic map and the Joint Operations Graphics. Prototyping of these products is now underway with completion scheduled for mid January 1987.

BACKGROUND

In 1984, DMA in concert with the Naval Ocean Research and Development Activity (NORDA), performed a map chart design study. This task included a critique of the DMA product line and an evaluation of current designs in view of future production via automated means. The study revealed that many DMA products are poorly designed and not optimized for transfer of information to the user. In many instances maps/charts are cluttered with too much detail and contain redundant information. The use of multiple type fonts and descriptions placed adjacent to unique symbols for amplification is an example of this situation.

It was also noted that the level of detail that is depicted on a map/chart is not always in consonance with the scale of the product. Logically one would expect that as the scale becomes smaller less detail is portrayed on the map/chart. There are some striking exceptions to this in many DMA products. Research also failed to reveal reasons for much of the traditional symbology and style of the products.

Another important factor that caused DMA to pursue this map/chart study was the potential for reduced fiscal resources in FY 87 and beyond. It is likely that we will be faced with serious budgetary reductions which will translate to reduced output and diminished customer satisfaction. Several attempts to satisfy requirements by modifying the DMA product in the form of an interim product have proven to

be very cost effective. Thus we believe that modifications to present product designs can improve useability and also benefit DMA with lower production costs. The result could be increased DMA output or maintaining current output with budgetary reductions. In either case the users will be provided with the maximum DMA support possible.

SCOPE OF PROBLEM

A team was formed with representation from the research/ engineering and requirements organizations within DMA and from NORDA. The first task performed was to review the work of the DMA Mark 90 Specifications Standardization Working Group. This is an internal group that is tasked with the responsibility of standardizing the specifications of the 28 base line products for use by the digital production system of the 1990's (Mark 90). Considerable effort has been put forth to establish common symbology and specifications on DMA products. The scope of this work was limited however to the existing specifications and did not include developing new methods of portraying information. For example, standard line weights and common symbology were adopted across product lines where possible but very few new symbols were designed as a result of this effort. The review of this effort proved very useful because it pointed out the multiplicity of symbols and other specifications now in use and planned for the DMA Mark 90 production system.

The next phase of the study was a complete review of the product lines (aeronautical, topographic and hydrographic). A detailed matrix was generated for each product that summarized all pertinent information about that product, i.e., user information, product review results, etc. Comments from users of DMA products were also added to these matrices. The following summarizes the results of these reviews.

Aeronautical Products and Air Target Material

The problem of the similarity of the Series 200 and JOG R was reviewed extensively. The issue of why one product cannot satisfy all users has been discussed for some time. The Series 200 serves a specific use for SAC and it is also heavily used by the intelligence community as a base for target referencing. The JOG R is required by tactical users involved in joint operations. At the present time there are few overlapping areas where these products are produced.

There are still, however, inefficiencies in producing two such similar products using different specifications. In particular, additional expense will be incurred if both of these products are developed in the all digital system (Mark 90) of the future. DMA will be trying to resolve this issue with the users in the near future.

The small scale aeronautical navigation planning products (ONC, JNC, GNC) are complete in terms of worldwide coverage. DMA only expends resources to maintain these products. New designs for these type products would have little economic benefit and could even be more costly. If a new specification were developed and applied pre Mark 90, the maintenance process could require color-reseparation of entire sheets.

Tactical Pilotage Chart (TPC)

The TPC is a widely used DMA product and there is a substantial portion of the world that remains uncovered. The current requirements cycle has surfaced an increase in the number of TPC's required by SAC. This requirement is a direct result of SAC standardizing on the the TPC for navigational purposes. DMA is in the process of validating this requirement. The map/chart design team believes that the TPC is now one of the better designed products, however, improvements can be made which will improve useability and production costs.

Topographic Products (1:50,000 scale topographic map, 1:100,000 scale topographic map, Joint Operations Graphics)

The Topo Products review revealed significant areas where improvements and savings could be realized. The large scale topographic map (1:50,000) is expensive and time consuming to produce. The tremendous amount of information portrayed and the symbology used are the contributing factors to the expense. Recently DMA departed from the traditional 1:50,000 specifications and produced provisional editions of sheets in the CENTCOM area of responsibility. This was done in order to meet critical commitments with limited resources. The provisional specification were developed to provide the user with a usable product but at the same time departed from traditional symbology in order to reduce costs. In particular those symbols that require precise registration such as cased roads were eliminated and a more simplified symbol used. The study team recommended that the provisional 1:50,000 scale topo map form the basis for a redesign of the standard 1:50,000 scale topo map.

The 1:100,000 scale topographic map was also reviewed thoroughly. A final color proof of the prototype developed by NORDA has been produced and some preliminary conclusions can be drawn. The team believes that there is benefit in pursuing a design for a new multi-purpose 1:100,000 product. Representatives from Army ACSI were invited to brief the team on the impending Army requirement for a 1:100,000 scale Army aviation product. A newly designed product of this type could have significant benefits to users and to DMA since there is a possibility that a well designed 1:100,000 map can substitute for a 1:50,000 map in some areas. This would greatly reduce DMA production costs and provide more area coverage to the user.

The design of the Joint Operations Graphics (JOG A and JOG G) resulted from years of interaction with the users and coproducers. There are many flaws or compromises in the current design. Our research reveals that there are no good reasons for many aspects of the current design. For example, the hypsometric tints on the JOG are not logical and do not provide the user with the correct impression of the terrain. Elevation tints can be made much more useful simply by varying the color density as a function of height. The team concluded that effort should be applied to the JOG problem with the goal being a better designed product that would be more efficient to produce.

Hydrographic Products

Review of the Hydrographic products revealed some interesting points based on user feedback. A data base of user comments is maintained in the quality office at the DMA Hydrographic Topographic Center (DMAHTC). There are comments that deal with chart scale and format and it appears that our users would like DMA to standardize chart scales and sizes. There is an informal effort underway at HTC to standardize the coastal charts at 1:300,000. However, each new chart is planned and formatted based on the navigation aids available in the area and chart overlap is based on DMA's interpretation of ease of use. The team believes that this problem should be addressed as a sub issue of the map/chart design study.

SUMMARY OF PROTOTYPING EFFORTS

In summary the Map/Chart design team recommended that the following products be further analyzed and prototypes of new designs be produced:

a. Tactical Pilotage Chart (TPC).

b. 1:50,000 scale topographic line map.

c. 1:100,000 scale topographic line map.

d. Joint Operations Graphic Air (JOG A).

e. Joint Operations Graphic Ground (JOG G).

The TPC redesign process will look at the use of shaded relief and the portrayal of vegetation. The need for depicting pictorialized landmark features and Special Use Airspace will also be examined. Other cost reducing initiatives that would not degrade the product and improve readability are:

a. More simplified road classification.

b. Eliminate North and East overlap.

c. Reduce number of place and feature names.

The 1:50,000 and 1:100,000 scale line map redesigns will look at the following areas:

a. Road classification - a more simplified symbology such as elimination of casings on road symbols.

b. Eliminate redundant labeling of unique symbols

c. Trim map sheets to the neat line on two sides to facilitate mosaicking of sheets together by users and reduce paper costs.

d. Reduce the number of symbols that depict similar things.

The JOG G and JOG A redesigns will look at the following:

a. Simplification of road classification.

b. Redesign hypsometric tint to be more logical.

c. Evaluate need for shaded relief.

d Reduce clutter by eliminating redundant symbology/names.

Work on these prototypes will be accomplished in-house at DMAAC and DMAHTC. Estimated completion of this project is 15 January 1987. HQDMA will be coordinating these prototyping efforts with the users to solicit input to the process.

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